



## Consumer Perceptions on Availability, Quality and Consumption of Urban Water: A Case Study of Kollam District in Kerala

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### Abstract

India is a country with very deep historical roots and strong cultural traditions. These are reflected in our social fabric and institutions of community life. Most important among these is the tradition of collecting, storing and preserving water for various uses. Water, a gift of nature, is becoming scarce, insufficient and unsafe for human consumption. The availability of water for urban households is much below the norms fixed by the Central Public Health and Environmental Engineering Organisation (CPHEEO). Kollam, is an old sea port town along the shore of Ashtamudi Lake in the state of Kerala. Despite having extensive piped network, the water supply is spasmodic, of low pressure and frequently not potable. Sasthamkotta Lake, also categorized as a wetland, is the largest fresh water lake in Kerala, provides the drinking water needs of half a million people of the Kollam district and also caters to fishing resources. The lake - a designated wetland of international importance under the Ramsar Convention since November 2002 - is slowly dying due to many reasons, which include alarming decrease in water level and pollution of the lake water which has put the biggest fresh water lake in Kerala at risk. This study is intended to inquire into the availability problem of piped water among the urban consumers and water consumption pattern of consumers of different income levels.

**Key words:** Urban Water, Availability Problem, Consumption Pattern.

### Introduction

Water is a sustainer of all forms of life, including vegetation and forests, and plays a vital role on planet earth. India's water resource management initiatives are generally more comprehensive than found elsewhere. The problem, however, is that almost in every country there is need for significant improvement. India's needs are particularly severe because of its rapidly developing water constraints, environmental problems, huge population, regional inequalities in water availability, the federal administrative structure, and rapid demographic and economic growth. Developing economies have universal need for a new and improved water supply system. Thus, it becomes the responsibility of governments in such countries to collect, process and supply safe drinking water as public service to the community through budgetary resources. The demand for such a life supporting system like water has grown as a consequence of increased urbanization, industrialization, population growth and the like factors. Urbanization has a peculiar profile particularly in developing economies like ours. It widens the gap between demand for and supply of civic amenities in urban centers. Among these amenities water is to be singled out as the very existence of humans

depending on it (O.P Bohra,2001). There also exists large scale inequality in the distribution of basic services in general and drinking water, and sanitation in particular, not only at the intercity level but also at the intracity level (Bidyut Mohanty,1988).

There is a mistaken notion that Kerala is abundant in water resources. Even if the state experiences both South West Monsoon and North East Monsoon, there is large spatial and temporal variation in the rainfall system and the abundance of water resources in one season leads to the shortage in next season. Due to rapid urbanization, increased economic activity, population explosion, changes in land use pattern and higher standards of living, the gap between the demand for and supply of water has been widening. To meet this demand, augmentation of existing water resources by development of additional sources of water or conservation of the existing resources through impounding more water in the existing water bodies and its conjunctive use are required. An integrated water management system is essential to ensure sufficient water in the entire system. Rain water harvesting and ground water recharge must be effectively implemented to reduce the consumption of potable water and sustainability of ground water resources. (Kerala Economic Review 2012, Kerala State Planning Board, Thiruvananthapuram). In the state of Kerala, water conservation is the most neglected part of water resources development, even though it is the most vital link in water management.

Kollam District which is bounded by the Arabian Sea in the west and Sahyadri Mountains in the east has a glorious past. Kollam, an old sea port town on the Ashtamudi Lake was formed on 1st July 1949. There are 4 urban water supply schemes in Kollam district. Urban water supply schemes are there in Kollam, Paravur, Karunagappally and Punalur. The total number of domestic consumers under these schemes comes to about 41937. Even though these schemes are in operation for urban water supply, the slum areas have supply of water only for about 2 hours a day. Despite having extensive piped network, the water supply is spasmodic, of low pressure and frequently not potable. They cannot use the well water as it is brackish. As far as the slum areas are concerned there is no daily supply of water. During the drought seasons, they get water only for 2 to 3 days week. As far as residential colonies are concerned they also depend on urban water supply for drinking. The water from tube well is also not suitable for drinking, as it is turbid. They also have limited hours of supply of piped water. Sometimes the water is not suitable for drinking because of excess chlorine smell. Leakages of water due to breaking of pipes are also common. Sasthamkotta Lake- the largest fresh water lake in Kerala, also categorized as a wetland- meets the drinking water needs of half a million people of the Kollam district, provides fishing resources, as well. The purity of the lake water for drinking use is attributed to the presence of large population of larva called *cavaborus* that consumes bacteria in the lake water. The lake is a designated wetland of international importance under the Ramsar Convention since November 2002. The lake is slowly dying due to many reasons, which include alarming decrease in water level and pollution of the lake water which has put the biggest fresh water lake in Kerala at risk.

In the state of Kerala different slab systems are followed by the Kerala Water Authority as tariff for water. The income levels of consumers are different and their consumption pattern of water is also different. The water conservation element is also not given due importance in such a rain abundant state like Kerala. This study is intended to inquire into the availability problem and problems in the quality of piped water and water consumption pattern of urban water consumers of different income levels.

### **Objectives**

1. To investigate into the availability problem and problems in the quality of piped water among urban consumers in Kollam district.
2. To investigate the water consumption among urban water consumers of different income categories.

### **Hypothesis**

1. There is no significant difference in the water consumption of consumers belonging to different income categories

### **Methodology**

The total number of urban connections was 41937. So, almost 1.5 percent connections rounding nearest 100 were selected randomly from total connection. Thus the total sample size becomes 600. Then number of samples from each Corporation/Municipality was fixed with probability proportional to sample size. That is proportional to the total connections in each Corporation/Municipality. It was also decided to select households from a minimum of two wards from each Corporation/Municipality. As the sample size to be selected from Kollam Corporation is high, sample households were selected from eight wards of Kollam Corporation. Thus, a total of 600 beneficiaries were selected for analyzing the consumption pattern and availability and quality problems. The details regarding the connected water consumers were collected from the Water Connection Register from the concerned water authority offices. Statistical tools like percentage and tests like Z test and ANOVA are used to analyze the data.

### **Water Availability Problem**

The present water supply system in the urban areas of Kollam District is thoroughly inadequate in terms of quantity and quality. The perception of consumers regarding water availability problem is analyzed using percentages. Water availability problem is measured by comparing the present consumption with the norms fixed by the CPHEEO.

### **Severity of drinking water availability problem in the locality**

Data regarding severity of drinking water availability problem in the locality is collected for understanding the extent of drinking water problem in the locality. The respondents of the Corporation and Municipal areas were asked about their

perceptions on severity of drinking water problem in the locality and were compared using percentage analysis. The responses include very severe, somewhat severe and not severe and is shown in table 1.

**Table 1**

**Severity of the drinking water availability problem in the locality**

Severity	Corporation		Municipality		Total	
	Count	Percent	Count	Percent	Count	Percent
Very Severe	165	38.3	37	21.9	202	33.7
Somewhat Severe	235	54.5	125	74.0	360	60.0
Not severe	31	7.2	7	4.1	38	6.3
Total	431	100	169	100	600	100

Source: Sample Survey

Percentage analysis shows that the severity of the water availability problem is different in the Corporation and Municipality areas. For examining the availability problem the water consumption of consumers is also compared with the norms fixed by the CPHEEO. As per the norms fixed by the CPHEEO the per capita water consumption of households in an urban area with a population more than 20000 is 135 litres per person per day (IS Code December 2010). Norms fixed by the CPHEEO Manual is given in table 2.

**Table 2**

**Norms fixed by the CPHEEO Manual**

Sl.No	Classification of towns /cities	Recommended Maximum Water Supply Levels(lpcd)
1	Towns provided with piped water supply but without sewerage system existing/planned	70+ 15% for leakage
2	Cities provided with piped water supply where sewerage system exists/planned	135+ 15% for leakage
3	Metropolitan and Mega cities provided with piped water supply where sewerage systems existing	150+ 15% for leakage

Source: Ministry of Urban Development, Central Public Health and Environmental Engineering Organization Manual on Water Supply and Treatment, Third Edition - Revised and Updated (May 1999), New Delhi.

Whether the respondents having only home connection and those having other sources get water and consume according to the norms fixed by the CPHEEO was statistically checked using Z test and is given in table 3.

**Table 3**

**Comparison of per capita consumption with average lpcd (135 litre per day)**

Group	N	Mean	z-value
Only home connection	275	41.82 ± 1.66	56.031**
Including other sources	325	58.14 ± 2.31	33.217**
Overall	600	50.66 ± 1.50	56.116**

\*\* - significant at 0.01 level

Source: Sample Survey

The mean consumption of households having only home connection is much below than 135 lpcd. Likewise the mean consumption of households having other sources is also lower than the norms fixed by the CPHEEO. When all the respondents are taken together the mean consumption is lower than 135 lpcd fixed by the CPHEEO. It is inferred that the actual water consumption of households having only home connection as well as those having other sources of water is much below than the norms fixed as per the standard. Analysis is also done to compare the per capita consumption with average lpcd (135 litres per day) among different income class and is given in table 4

**Table 4**

**Comparison of per capita consumption with average lpcd (135 litre per day) among different income class**

Income group	N	Mean	z-value
< 5000	324	44.86 ± 1.63 <sup>b</sup>	55.281**
5000-10000	154	50.68 ± 3.20 <sup>b</sup>	26.36**
10000-15000	42	69.59 ± 6.17 <sup>a</sup>	10.59**
Above 15000	80	64.17 ± 5.43 <sup>a</sup>	13.046**
F-value		10.448**	

\*\* - significant at 0.01 level

Means having same letter as superscript are homogeneous

Source: Sample Survey

All the Z-value was found to be significant at 0.01 level and the mean consumption in each group was found to be significantly lower than 135 litre. Consumption of each income group is much below the norms fixed by the CPHEEO. Analysis was also done for comparing the per capita consumption among different income groups.

As the F -Values are significant; there is significant difference in the water consumption for domestic and non-domestic uses of different income groups. Duncan Multiple range test was done for finding out homogeneous groups. There is homogeneity in total water consumption and also water consumption for domestic and

non domestic uses among less than 5000 and 5000-10000 income groups. Likewise there is homogeneity in total water consumption and also water consumption for domestic and non domestic uses among 10000-15000 and above 15000 income groups. However the water consumption of less than 10000 age groups are significantly lower than above 10000 age groups.

**Problems in the Quality of Piped Water**

Any analysis about the efficiency of water supply system without considering the quality of water supplied is incomplete. The results of the pilot study has identified problems like brackishness, turbidity, chlorine smell, bad smell and green colour in the water supplied by water authority. Hence data regarding awareness about water quality problems is analyzed and presented in Table.5

**Table 5**  
**Problems in the quality of drinking water**

Problems	Corporation (n=431)		Municipality (n=169)		Total (n=600)	
	Count	Percent	Count	Percent	Count	Percent
Brackish	95	22.0	53	31.4	148	24.7
turbidity	249	57.8	97	57.4	346	57.7
Chlorine smell	265	61.5	134	79.3	399	66.5
bad smell	31	7.2	8	4.7	39	6.5
Green colour	18	4.2	7	4.1	25	4.2
Above all	4	0.9	3	1.8	7	1.2

Source: Sample Survey

Perusal of data in Table.5 reveals that in the Corporation and municipality areas the problems mostly highlighted by respondents are chlorine smell and turbidity followed by brackishness. Other problems include green colour and bad smell. The problems in the water quality noticed in drinking water justify the need for urgent revival and improvement of urban water supply in the District.

**Comparison of consumption among the respondents having different income**

**Table 6**  
**Comparison of consumption among the respondents having different income**

Group	N	Mean	□ <sup>2</sup> -value
< 5000	323	297.60 ± 6.87 <sup>b</sup>	42.089**
5000-10000	154	323.97 ± 16.51 <sup>b</sup>	
10000-15000	42	407.38 ± 31.97 <sup>a</sup>	
Above 15000	80	482.88 ± 32.35 <sup>a</sup>	



*\*\* - significant at 0.01 level*

*Means having same letter as superscript are homogeneous*

Source: Sample Survey

H<sub>0</sub>: There exists no significant difference in the water consumption among the respondents having different income level.

Whether the water consumption is influenced by changes in income level is tested by using Kruskal Walli's ANOVA .The calculated value is greater at level of significance 0.01 the null hypothesis is rejected that there exists no significant difference in the water consumption among the respondents having different income level (level of significance-0.01). Since there is significant difference in the water consumption among different income groups, between group comparisons was done pair wise, using Mann Whitney U test. Even though an increase was noted in the water consumption as increase in the income level, no significant difference was noted between < 5000 and 5000-10000 income groups. Similarly no significant difference was noted between 10000-15000 income groups and above 15000 income group. However 10000-15000 income group and above 15000 income group consume more water compared to other two low income group category.

### **Conclusion**

The availability of water in Kollam district in terms of quality and quantity is poor. The perception of the consumers regarding the availability reveals that they are concerned with the severity of the non-availability. The availability of water for the urban households of Kollam is much below the norms fixed by the CPHEEO. It is not sufficient to meet the minimum needs of the population. There are so many problems in the quality of drinking water which need urgent attention. There is significant difference in the water consumption pattern of households of different income categories. The rich consume more water, compared with the poor .The rich have other sources of water, compared with the poor. There is need for urgent interference from the local authorities for ensuring ample supply of water for the urban population. The quality of water supplied is also a matter of concern. There is an urgent need for conservation of the sources of water and also finding out new sources so as to meet the demands of the existing population and the future generation.

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